

881.

Problem 55.35 (RHK)

We have to calculate the height of the Coulomb barrier for the head-on collision of two protons. The effective radius of a proton may be taken to be 0.80 fm.

Solution:

We will calculate the height of the Coulomb barrier for the head-on collision of two protons, assuming that the effective radius of a proton may be taken to be 0.80 fm.

$$\begin{aligned} U_{\text{coulomb}} &= \frac{e^2}{4\pi\epsilon_0(2r)} \\ &= \frac{(8.99 \times 10^9) \times (1.6 \times 10^{-19})^2}{(2 \times 0.80 \times 10^{-15})} \text{ J} \\ &= 14.384 \times 10^{-14} \text{ J} = \frac{14.384 \times 10^{-14}}{1.6 \times 10^{-13}} \text{ MeV} \\ &= 899 \text{ keV.} \end{aligned}$$